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EDITORIAL

Mahmut Nedim DORAL, M.D.
Editor

Dear Colleagues,

Here we are here again with the EFOST Summer 2011 Newsletter. The first period of 2011 was very intensive for scientific meetings. We represent EFOST in AAOS 2011 Annual Meeting, 8th Biennial ISAKOS Congress and 12th EFORT Congress successfully. You may get more informations about Copenhagen Session below from Dr. Carmont at pages 5-6 also presentations of EFOST members in this session could be downloaded at EFOST official website www.efost.org. Dr. Carmont and Dr. Papadopoulos were two maestros at the EFORT/Specialty Day. See you in Berlin EFORT/Specialty Day in 23-25th of May, 2012.

We have some news in this EFOST NL. First edition of our new book **Sports Injuries - Prevention, Diagnosis, Treatment and Rehabilitation** will be published at the end of September by Springer. This book with 1247 pages is the product of sleepless nights and the valuable efforts of more than 300 scientists from around the world: Japan to the US, Nepal to Israel, Hungary to Spain. It gives us great honor to have integrated Eastern and Western scientists. I would like to express my gratitude to all authors who provided their valuable experience for this work. I would also like to thank the co-editors Dr. Gideon Mann, Dr. Reha Tandoğan and Dr. Rene Verdonk in addition to Advisory Board. Special thanks to my assistant editors; Dr. Gürhan Dönmez, Dr. Egemen Turhan. Thank you all!

Please do not forget that the science has no religion, no language, no race, no color, no flag!

Our new Board and President leading us for growing EFOST faster. The official journal of EFOST; MLTJ will be published soon. Please visit the website of the journal (www.mltj.org) and do not hesitate to send your scientific papers.

Let's enjoy with the Summer Newsletter!..

Prof. Mahmut Nedim Doral, M.D.

EDITORS NOTE

Gideon MANN, M.D.

Editor

The Summer 2011 Issue of our Newsletter is now on the web. The Eighth Volume, has been designed again to allow our members an insight to EFOST, to provide information on upcoming meetings and events, to spread the knowledge on available courses and fellowships and to access updated scientific information as reviews of current literature abstracts.

We are launching additional sections in our Newsletter: An interview with a leading person in our field, a clinical case with detailed debate and with key person opinions and shortly "Tip and Pearls" from our members.

Could we possibly encourage you, our faithful members, to send in interesting material of your own: Interesting arthroscopic or surgical pictures, surgical tips you use, an interesting case you have encountered or a solution you have discovered when a problem came up, and others may benefit from knowing it.

We, the EFOST Board and Newsletter Editorial, wish you a beautiful, peaceful and productive summer.

Prof. Gideon Mann, M.D.

Meir University Hospital Medical Center
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EFOST SESSION IN 12th EFORT CONGRESS

Watersports & Upper Limb problems session, 2nd June 2011.

Co-chaired by Mike Carmont & Pericles Papadopoulos

The EFOST satellite session at the 12th EFORT Congress in Copenhagen was housed in the Jupiter room of the conference centre. The session started early on the 2nd of June with an introduction from Co-chair Mike Carmont familiarising the audience with come of the history, direction and aims of EFOST and this year's focus on Watersports and Upper Limb Injuries.

This years session was to focus on watersports problems looking at competitive, acrobatic and artistic elements in the water with swimming, biceps injuries diving and synchronised swimming and finally waterpolo. Further competitive disciplines on top of the water consisted of rowing, kayaking and canoeing before finally looking at the sport of waterskiing. This has several elements combining artistic strength and agility whilst towed behind a boat with waterski jumping flying through the air and attempting to land and continue on the water surface.

Invited speakers were renowned sports surgeons who were not only experienced in the field of upper limb surgery but had competed to a high level in the sports they were presenting on.

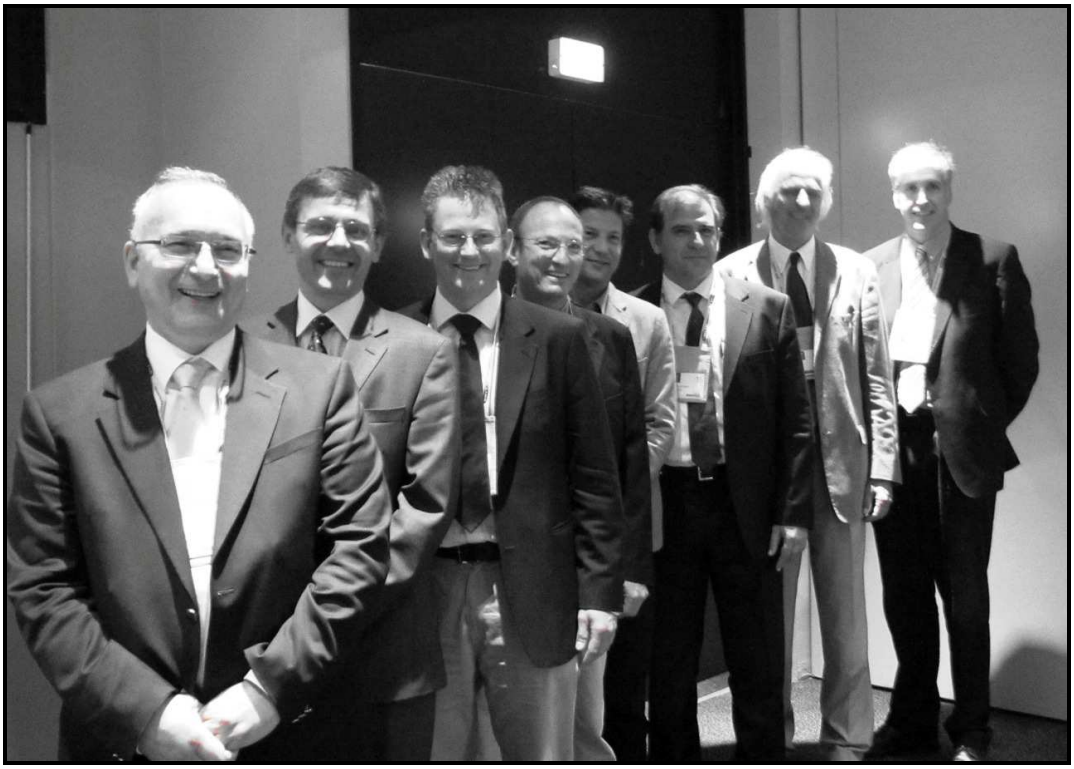
The session started with a general presentation on swimming injuries by the President, Francois Kelberine followed by a specific session on biceps injuries from Bas Pjinenberg. Kevin Boyd highlighted the strains that are particularly associated with diving notably the

wrist. His presentation on the demands of synchronised swimming stunned the audience. I don't think anyone appreciated the combination of artistic performance, strength and anaerobic power exhibited by these athletes.

Jeno Kiss was brought to EFOST for the meeting and Hungarians are World Champions and the dominant force in waterpolo. We again heard of the power needed coupled with dextrous ball handling required for this Olympic sport. Kostas Ditsios has previously competed at rowing to a high standard and he reported on the forces involved with competing at this level coupled with his experience of providing medical care for the athletes at the Athens Olympics. Flatwater kayaking and canoeing is a popular spot on continental Europe but however relatively minor one in the UK. The different disciplines were explained by Mike Carmont together with the subtle aspects of balancing a marathon kayak boat.

Simon Roberts increased the speed with a presentation on waterskiing. The audience once again in awe of the different tricks that can be achieved and the aerial propulsion of the ski jumpers.

Our Co-chair Pericles Papadopoulos, took questions, thanked the speakers our hosts and closed the session. The audience were invited to join us in London to attend the World Sports Trauma Congress and the 7th EFOST meeting 16th-20th October 2012.



REPETITIVE PHYSICAL ACTIVITY AND THE INCIDENCE OF ARTHRITIC CHANGES IN THE LOWER LIMBS

Review Article

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Key Words: Osteoarthritis, Physical Activity, overuse, running

In order to evaluate the impact of physical activity, especially continuous activity as walking, cycling or running, on the lower limb joints, we overviewed near one hundred sources observing the subject from various directions and from different research points of view. The sources were divided into five categories: those claiming damage, those who are not conclusive, those which claim no damage, reviews, and animal experiments.

Observing the full material shows the evidence that High Impact Sports Activity will damage a normal joint which has not suffered a previous injury or anatomic variation and which does not carry a genetic fault, to be borderline, though existent. In cases which present with Osteoarthritis, a concealed injury often has previously occurred, single or recurrent.

The evidence that continuous Non-High Impact Physical Activity like walking, cycling or running would damage a joint with no prior anatomical damage and which does not suffer a biomechanical or genetic fault, is weak and non persuasive, while the literature supporting no damaging effect or even improvement of the joint construction is far more persuasive and abundant. This evidence observed in human subjects and in animal experiments, is still stronger in animal experiments than in research performed with human subjects.

The safest activity, it seems, is gradual and graded activity with no exploding force, not extreme and which is not irregular for the individual trainee.

The advantages of the physical activity to the general health as well as to the musculo-skeletal system seem to strongly overcome their potential risks.

In the 2000 World Congress on Orthopaedic Sports and Trauma held in Queensland, Australia, and in the 2003 ISAKOS Meeting (International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine) held in Auckland, presentations were given discussing the arthritic changes that occur in the lower limb joints as a result of running (1). This was later published in "Orthopaedics Today" due to its interest for the general public. The subject was reviewed again in 2007 at the Sports Medicine Meeting of the University of Torino, Italy (2). For many years this subject, understandably, preoccupies the minds of both part-takers in physical activity, be it for enjoyment or out of awareness of their physical wellbeing, as well as preoccupying General Practitioners, Sports Physicians, Physical Education (PE) teachers, coaches, and the healthcare professionals required to advise the general population regarding physical activity.

It seems that, invariably, the presence of congenital anatomical abnormality or an injury that has changed the anatomical or biomechanical configuration of a joint, will lead to arthritic changes, in a relatively high proportion of injured individuals (3-12), a large proportion of whom have encountered a torn Meniscus (13-15), or have suffered an anterior cruciate ligament (ACL) tear (7,14-17).

In the absence of a past history of joint injury, it seems that high impact activity, such as some ball-games, may comprise a risk factor for the development of degenerative (i.e. wear and tear) changes in the knee and hip (9,11,18-21), although some argue that in the absence of anatomical or neuro-muscular damage as well as the absence of high impact physical activity and repeated rotation, the activity will lead to radiological changes (such as osteophytes) but not to true arthritic changes (22), or in the absence of defined injury, might not bring to any locatable arthritic changes at all (23). Melzer et al in 2001 showed a higher rate of degenerative changes in the contra lateral knee of traumatic amputees (24) while no significant difference was shown when comparing volleyball player amputees to amputees who led a sedentary life style. This observation though did not reach significance.

Nonetheless, some publications tend to support the view that high intensity sport may be a factor in the development of arthritic changes in the lower limbs' joints: In a review of sports fields in general without differentiating individual sports, Vingard et al in 1993 (25) demonstrated a 4.5 fold rise in hip Osteo-Arthritis in a population previously active in high intensity Sports. The rate rose to 8.5 fold when work exposure was added. Track & Field and Racket sports were specified as higher risk sports. Without specifying the type of sport, Vingard et al further reported in 1998 (26) an occurrence of degenerative changes in active women 1.5 to 2.3 times higher than in the normal population, depending on their exposure to sport. L'Hemette et al showed a rise of degenerative changes in the hip in past Hand Ball players (18). Several publications have discussed the issue of high rates of arthritic changes in the knee and hip joints of footballers; where the highest incidence is seen in professional players, while certain authorities have claimed that the hip joints are not affected in amateur footballers more than in the general population, whereas the knees show high rates of arthritic changes in both professional and amateur players (27-35). Certain degenerative changes in the hip have been demonstrated by other authors (36-37) in connection to general sports activities. Lane, in 1999, reviewed 5,818 women aged 72 on average (38), and showed an increased risk of osteoarthritis (OA) of the hip in women who reported significant physical activity in their past, without documenting running as a separate issue. In 2000, Sandmark (39) detected high rate arthritic changes and injuries in the knees of 571 Physical Education (PE) graduates, on the basis of

personal reports alone, without the use of X ray findings. Cooper, in 2000, (40) performed a radiological review of a physically active population aged 76 years on average, and detected an excess risk for OA of the knees, though without progression compared to X rays taken five years previously. Lahr in 1996 (12) noted no increased risk of osteoarthritis nor acceleration of existing osteoarthritis in individuals involved in moderate running and who did not suffer anatomical variances.

Hunter and Eckstein in their recent 2009 review (41) similarly observed no negative effect of vigorous low impact activity on joints and positive benefits of exercise on joint tissues. Accordingly they suggested that the increased rate of Osteoarthritis observed in elite sports by some investigators may well be dependant on injury occurrence and not on the sports as such.

In the next few lines we intend to address repetitive physical activity (i.e. walking, cycling and, mainly, running) as a possible factor contributing to wear and tear changes (i.e. OA) in the joints of the lower limbs. When preparing this review, we used material that was previously prepared for presentation at the World Congress on Orthopaedic Sports Trauma, Queensland, Australia, in 2000 (1); material used in lectures given by us to doctors at the post-graduate program for Sports Medicine at the Tel Aviv University, Israel; material from literature reviews published in the past; and material from an updated literature search.

The subject will be discussed according to the following topics:

1. Publications supporting a link between repetitive continuous physical activity and arthritic changes in the joints of the lower limbs;

2. Controversial or problematic publications:

3. Publications which found no relationship between running or continuous low impact sport and osteoarthritic changes in the joints of the lower limbs;

4. Literature reviews;

5. *In vivo* studies (animal studies).

1. Publications supporting a link between repetitive physical activity and arthritic changes in the joints of the lower limbs

Ever since Freeman published his thoughts on cartilage fatigue and cartilage erosion in 1975 (42), and from the time that Radin, in 1982, published his observation on the protective effect of a soft surface (sawdust) compared to a hard surface (concrete), in preventing arthritic changes in the knees of walking sheep (43), several publications appeared supporting the thought that repetitive exercise such as running might cause arthritic changes in the lower limb joints.

In 1989, Marti published his observational study, in which he demonstrated radiological arthritic changes in the lower limbs of runners, depending on intensity of running and the cumulative distance (44). This publication caused a great deal of confusion in light of the combined international efforts made at the time to encourage physical exercise in the general population, in aim of promoting health, as the study created a valid excuse to avoid physical exercise by many who truly needed it for their wellbeing. A few years later, in 1994 and in 1995, publications by Kujala *et al* appeared, which demonstrated a relative risk (RR) of 1.73 of developing OA of the hip, the knee and the ankle in elite Finnish retired runners (30,45), and radiological changes supporting OA were demonstrated in 67 female runners by Spector et al in 1996 (46). Nonetheless, it should be emphasized that the observation of osteophytes on the radiograph, does not necessarily reveal the presence of clinical OA (40-41,47-48), nor do radiographic changes suggesting osteoarthritis (marginal osteophytes, subchondral sclerosis and joint narrowing) correlate regularly with pain (41,49).

2. Controversial or problematic publications

This paper, naturally, would relate mainly to Weight Bearing Sports. Publications that do not discuss different fields of sports independently; publications which do not entail details of the type of activity or of the age of the individual when taking on the activity; publications which do not entail a complete report of previous history of injuries; or ones which do not contain a control group or contain a control group which is essentially different from the group being investigated; all constitute a basis which allows conclusions to be made only with caution. Other publications constitute a problem by the implications of their

findings or if their findings are difficult to explain and are logically unfeasible, requiring further investigation. The method of diagnosis for OA presents another difficulty as osteophytes may not represent OA (40-41, 47-48), radiological changes may be totally asymptomatic (41,49) and "self reported" OA may have little true significance (41)

In 2000 Neidhart (50) pointed out the presence of cartilage metabolites in the blood of marathon runners. Does this suggest cartilaginous damage or perhaps increased metabolism and raised anabolism? Kessler et al demonstrated in 2006 the loss of cartilaginous and meniscus volumes during a run of 5 Km while the meniscus continues to lose its volume in up to 20 Km run (51). According to the authors, duration is not related to the development of arthritic changes. In 2000, Cheng et al reported their findings in 16,961 individuals, in which they tried to determine whether physical activity such as running might cause arthritic changes (52). In those under 50 years of age, the authors found a Relative Risk of 2.4 for developing arthritic changes in men. No risk difference was found in men over 50 years of age nor in women. These results are difficult to explain especially as the diagnosis was made on the basis of "personal report and doctor's diagnosis". The article did not give full details of the fields of sport; neither did it review previous injuries and past medical history. Similarly, Sandmark and Vingard in 1999 (53) reported a relative risk for osteoarthritis of 2.9 for men aged 55 to 65 years who were highly exposed to all kinds of sport. The limited age range should be noted as well as the observation that no increased Relative Risk was seen in women. The authors concluded that "Moderate daily general physical activity was not found to be a risk factor".

In 1999, Kujala et al published their findings on 269 orienteering runners' best in their field 15 years prior to the study, compared to 188 inactive individuals (54). Regardless of the theory under investigation, they found that the incidence of myocardial infarction was almost eight times as high in the control group. The authors indicated a rise in the incidence of arthritic changes in knees of old athletes, although not in the hip joint. Interestingly, the athletes' disability was less severe than the control group.

In 1997, the article of Sarna et al was published, comparing 2,613 Finnish athletes that were active during 1920-1965 to a control group of 1,712 people (55). The athletes showed an increased longevity, an increased length of active lifestyle, a lower incidence of diabetes mellitus, and a slight increase in the incidence of arthritic changes. An increased incidence of arthritic changes was demonstrated in runners by McDermott and Freyne in 1983 (56), but only in those runners who were noted to have abnormal anatomy (meniscal tears, varus deformity of the knees, congenital joint laxity). Similar findings were picked up by Buckwalter in his review in 2003 (8) and by Hunter and Eckstein in their recent review of January 2009 (41). In 1991, Radin *et al* (57) suggested the "miscoordination" element as a cause of arthritic changes due to the force of the heel strike during stance and an excess of uncoordinated load. Shrier reviewed different clinical studies in 2004, and similarly to Radin's view in 1991, concluded that defective muscle function (i.e. power, coordination) is the prime aetiological factor in the development of arthritic changes in the joints during exercise, and not the actual activity itself (58).

3. Publications which found no relationship between running and osteoarthritic changes in the joints of the lower limbs

In 1986, 1993 and 1998, Lane published her findings on running club members compared to a control group (59-61). In the follow-up of 41 runners after five and nine years, she found no difference in the incidence of arthritic changes in the knees nor in the back. Furthermore, the nine year follow up showed a reduction in the narrowing of the joint space of the knee in female runners compared to the control group (61). The Radiographic Assessment of Osteoarthritis in Lane's paper was based on the methods developed at the San Francisco Conference on Radiographic Assessment of the Progression of Osteoarthritis as published by Altman in 1987 (62). This included blind reading of serial knee weight bearing radiograph, by two radiologists, unaware of the date on which the radiographs were taken, nor the study group to which they belonged. Hips were evaluated by non weight bearing radiographs. The radiologists took a course at the end of which their reading agreement was evaluated and concluded as 0.85. Both medial and lateral joint spaces of the knee were measured.

Kujala followed up 2000 Finnish athletes who were admitted to hospital for OA: These athletes were divided into athletes of aerobic sports (running and cross country skiing), team games and power sports (30,45). Even though in most athletes more admissions than expected were noted the diagnosis of OA was made in 14% of the athletes compared to 12% in the general population, an insignificant disparity. Leaver examined 128 ultra-marathon runners in 1998 (i.e. running distances of 100 to 150 Km) and did not find an increased rate of OA, and even less so in the longer-distance-runners (63).

Back in 1975, Puranen (64) followed up 60 marathon runners radiologically and did not identify any difference in the rate of occurrence of arthritic changes compared to the normal population. In a prospective review that Panush carried out in 1986 with the aid of radiographs (65), she did not recognize increased incidence of arthritic changes in the hip, knee, ankle or joints of the foot in 17 runners. Her follow-up observation concluded the same outcome in 1995 (66). In 1990, Konradsen examined 30 runners who ran 18 to 40 Km in total per week for 40 years, and did not find a higher rate of OA on X-ray films of the ankle, knee or hip (67). Sohn compared 504 cross country runners to swimmers in 1985 (68) without the aid of X-ray films, and did not detect a difference in the occurrence of OA in the hip or knee. Eastmond in 1979 (69), with the aid of X-ray films, examined arthritic changes of the hip and knee in PE teachers with the aim of investigating arthritic changes that are caused as a result of moderate intensity exercise. No difference was found between the PE teachers and the control group. Bird and Barton, in 1993 (70), examined a similar group of PE teachers and did not identify an increased incidence of arthritic changes. In 1993, White (71) looked at a further group of past PE teachers and besides not finding an increased incidence of arthritic changes, he observed a lower rate of arthritic changes in the knee. A review of 216 individuals by self report of OA in the knee that was performed by Sutton in 2001 (72) disclosed that a history of knee injury was the only detectable risk factor for arthritic changes, with a RR of 8.0.

In the reviewed material there are several other publications that also point towards absence of increased occurrence of arthritic changes in the knees or hips of long distance runners (49,73-76). Kohatsu and Schurman, in 1990 (77), demonstrated different aetiological factors for the development of OA of the hip:

Being overweight constitutes a 3.5 fold increase in the risk of developing arthritic changes, hard physical work comprises a risk factor constituting 2.5 fold increase, previous injury increased the risk by a factor of 5.0, whereas physical exercise showed no risk at all. In 1994, Panush and Lane (78) created a table that included estimated risks for developing arthritic changes in the hip or knee in a variety of sports. The authors concluded that running produces "little or no" arthritic changes in the hip or knee.

In 1975, Puranen, in a letter to the BMJ[59] claimed that degenerative changes will occur in a frequency of less than half in athletes compared to the general population (4% compared to 8.7%).

Of special interest is the paper by Racunica *et al* (79), who in 2007 showed by MRI that vigorous physical activity in 297 adults aged 50 to 79 increased cartilage volume of the Tibial Plateau of the knee and reduced the incidence of cartilage defects. Regular walking was shown to reduce the risk of bone marrow lesions (79). Knee cartilage volume was measured using Magnetic Resonance Imaging, determining the cartilage volume by image processing on an independent work station using Osiris Software (University Hospital of Geneva, Geneva, Switzerland). The method was based on previous publications by Cicuttini ni 1999 (80) and by Wluka in 2001 (81). The observation of Racunica *et al*, previously mentioned by Frankel and Nordin (82), who showed a three fold thickness of the cartilage in the active human joint, may explain the findings of Rogers *et al* in 2002 (83), who showed a positive effect of physical activity on self reported physician diagnosed osteoarthritis of the hip and knee, and the findings of Roos *et al* in 2005 (84), who reported an increase of knee cartilage glycosaminoglycan content by moderate exercise in human subjects, diagnosed observed by using magnetic resonance. Foley in 2007 (85) observed that physical work capacity was negatively associated with cartilage loss, and thus concluded that physical activity has probably a protective effect on joint cartilage.

Hovis et al presented at the Radiological Society of North America 2010 meeting (109) their MRI study on cartilage changes 132 at risk patients aged 45 to 55 compared to 33 non at risk controls. At risk patients for knee osteoarthritis included over-weight, previous injuries and weak knee stabilizing muscles. Participants practicing light exercise showed better joint hyaline cartilage than

sedentary participants. Strenuous exercise, though, caused again the cartilage to deteriorate. Frequent knee bending also showed a negative effect on joint cartilage. These observations have not yet been published in a peer reviewed journal. Muscle weakness as such has been shown to form a risk factor for Osteoarthritis by Shrier in 2004 (111).

4. Reviews

Most of the reviews we identified in this subject discuss, first and foremost, the quality of the studies that were done, as well as the features of OA, the discrepancies between radiological and clinical findings, diagnostic criteria and the heterogeneity of the population. Retrospective studies are clearly defective in this context due to the imprecise reporting of exercise levels and injuries. The reviews, often, cover sports in general and do not always distinguish between repetitive activity, such as running, and other types of sports.

Factors such as previous injury, preceding anatomical abnormality or obesity, are all reported as risk factors for development of degenerative changes in the joints of the lower limbs, and appear as a leitmotif in the modern literature (11,20,86-90), as well as genetic composition that involve a Relative Risk (RR) of 2-5 (91). These variables may distort the results of the different studies. Lequesne *et al*, 1997 (92), did not find a rise in the incidence of arthritic changes in recreational activity, while in aggressive physical activity or in rigorous physical work they observed in the literature a RR of 1.5 to 5.0. In the same year, Buckwalter and Lane (89) did not find in their review any evidence of a link between moderate physical exercise and the occurrence of arthritic changes. In Hochberg's review in 2002 (88) the author detected "only limited evidence" of OA in the hip in athletics, including running, while Lievense, in a very thorough review in 2003, detected nine publications concerning running, of those three publications were very highly regarded, and these, as Lievense summarized showed "moderate evidence" of a link between running and arthritic changes in the hip (90). On the other hand, therapeutic exercise, inclusive of an aerobic and/or a strengthening program, was shown in a recent review by Hernandez-Molina in 2008 (93) to have a beneficial effect for Hip Osteoarthritis. In 2002, Conaghan (11) reviewed a large

number of publications, and concluded that there is only a low risk for individuals who run for their own health and leisure. Felson's review from 2004 (20), discussed mainly the subject of excess weight as being a risk factor for development of arthritic changes. When running is concerned, the review of Lane and Buckwalter from 1999 (94) is quoted inclusive of their summary of the risk factors for OA of the knee and hip. The authors pointed out no risk in running for leisure, and a small risk when running competitively.

A more recent review by Zeller and Sukenic (95) did not disclose any significant rise in knee osteoarthritis in runners nor did an editorial by Mann et al disclose excess arthritic changes in the large joints of the lower limb in continuous low impact sports (96).

A most recent review by Hunter and Eckstein published January 2009 (41) concluded that vigorous low impact sport would cause no OA, Elite Sport participation may cause a rise in OA probably following joint injuries and not necessarily due to the sport itself. The authors pointed out the positive effects of exercise on the Synovial Joint Tissues.

In the Osteoarthritis Research Society International (OARSI) World Congress in Montreal, Canada, in 2009 Segal presented his hypothesis concerning the etiology of Osteoarthritis (110). According to Segal, muscle weakness, especially of the knee extensors and poor proprioception may be factors in cause or prevention of Osteoarthritis of the knee. Muscle dysfunction as a cause of Osteoarthritis was once more supported by Shrier in 2004 (111) as mentioned in section 3 of this manuscript.

Another review was published by Bosomworth in the Canadian Family Physician in 2009 (112). The authors concluded there is good evidence, strong Level II, that exercise performed over a substantial period of time does not cause Osteoarthritis provided injury is avoided. They also concluded that there is robust Level I evidence that patients already suffering from Osteoarthritis will uniformly benefit from exercise, with reduction of pain and disability.

In 2011 Urquhart et al published their systematic review in the March issue of Medicine and Science in Sports and Exercise (113). The authors screened 1362 studies dealing only with humans and written in English. Of these, 37 were selected, of which 28 formed the base of their review. The authors concluded that though exercise may cause osteophyte formation, it brings on an increase in cartilage volume and a decrease in cartilage defects as seen on Magnetic Resonance Imaging. The authors concluded that physical activity is probably beneficial to the knee joint health.

5. In vivo animal studies

Considering the inconsistent data given in the literature, it seems that it is best to turn to in vivo studies, which in laboratory controlled conditions could give answers to controversial issues.(97) In 1995, Lapveteläinen *et al* (98) examined the effect of running on the occurrence of arthritic changes in C57BL-type mice, 70-80% of which develop arthritic changes. In this sample group, running led to a rise in the incidence of both moderate and severe arthritic changes, above the high normally observed incidence in this species. This finding strengthened the notion that in the presence of inherited pathology, genetic (91) or other, it is best to practice caution when planning a training program. Newton *et al* in 1997 (99) allowed 11 dogs to walk for 75 minutes per day in a pace of three kilometers per hour for 5 days a week whilst carrying 130% of their body weight. This experiment lasted throughout the dogs' life. The joint cartilage, ligaments, menisci and any presence of osteophytes was recorded. The data showed no difference between the study group and the control group. In 1992, Oettmeier *et al* (100) investigated the joint surfaces of running dogs. The subchondral bone and the joint cartilage were found to be thicker than those in the control group, with less arthritic changes. In the same year, Helminen (101) and Arokoski (102) examined the joints of dogs that ran uphill four kilometers a day for a year. The cartilage thickness increased by 3-23% and the proteogycan content increased by 59%. The increase in the cartilage thickness and the concentration of glycosaminoglycans was demonstrated also by Kiviranta *et al* (103) through the assessment of dogs that ran 15 kilometers per day for 40 days. By over-training the dogs (20 or even 40 Km per day) the positive effect on the patella was maintained, with the increase in both cartilage thickness and proteoglycan concentration, no changes were noted in the

medial compartment of the knee, and the lateral compartment suffered a drop in proteoglycan concentration with softening of the joint cartilage.

When using dogs as a model for Osteoarthritis it should be kept in mind that dogs tend to develop early arthritic changes when becoming ACL deficient, though they tend to do relatively well after meniscal repair or cartilage damage. Thus the dog model may not necessarily be the best model for Osteoarthritis research.

In 1981, Palmoski (104) demonstrated on a canine model that commencing an intensive physical program without prior preparation, would damage the joint cartilage, and so will excessively overloading cartilage which has degenerated due to unloading. However, when a gradual training program was used in young rabbits, the proteoglycan content increased, (105-106) the cellular activity was found favourable and cellular degeneration was reduced in running rabbits (107).

In 1998, Otterness *et al* (108) published their outstanding work done on hamsters: Joints of six young hamsters were compared to joints of 12 old sedentary hamsters and 12 old active hamsters. The cartilage on the femur was found to be smooth in the young hamsters and in the 12 old running hamsters, but was fibrillated and roughened in the 12 sedentary hamsters. The authors concluded that a sedentary lifestyle leads to a decrease in the proteoglycan content, decrease in the amount of synovial fluid, and to fibrillation and microscopic fractures of the joint cartilage.

DISCUSSION AND CONCLUSIONS

High impact physical activity, which entails sharp turns (i.e. rotational forces) and brakes, imposes great strain on the joints of the lower limbs, especially the knee and hip. These forces may traumatize the joint, change its stability by causing acute damage to the ligaments, or by modification of the anatomy through damage to the meniscus, cartilage or subchondral bone. These changes will lead to arthritic changes of the damaged joint. The literature implies that even in a situation where there are no obvious or "noted" injuries, the incidence of degenerative changes in a joint that encounters high impact physical activity would be higher than the incidence in the general population who do not undertake such activity. Even so, many argue that if the injury (be it solitary or multiple) would be

avoided, arthritic changes in the joints of the lower limbs would not be expected, not sooner nor later.

The supporting evidence showing development of arthritic changes in the lower limb joints; the ankle, knee, or hip, as a result of low impact continuous sport, such as running, walking or cycling, has not been established. Even though some strong studies point to the possibility of changes, radiological changes alone if not clinical changes as well, especially in the knee or hip, a significant number of studies did not detect any link between the activity and the arthritic damage, neither radiological or clinical, and a number of studies further disclose a protective effect on the joint cartilage.

In vivo studies, which are meant to allow collection of objective data, and are far more accurate and better controlled than clinical observations in human beings, reveal the positive effect that repetitive low impact activity such as running has on the joint and the joint cartilage, as long as the joint is not genetically impaired, is anatomically intact and is biomechanically balanced. In addition, the activity must be gradual, continuous, and not aggressive or excessive. When the animal being studied is exposed to activity for which it is not prepared, an activity of unusual intensity or an activity that exerts undue forces on degenerated or damaged joint cartilage for any reason including lack of use, it may very well be that the positive effect of the activity will become a negative one and this will damage the joint.

There is borderline, though possibly existing evidence, to suggest that high impact activity may damage an intact joint in which no previous injury occurred and in which there is no anatomical or genetic deficit. In the majority of joints showing arthritic changes, previous history would disclose a single or recurring injury, and the damaged joint would demonstrate arthritic changes which are secondary to that damage.

The evidence that repetitive exercise, such as running, walking or cycling, will damage a joint in which there is no anatomical, biomechanical or genetic abnormality, does exist but is controversial, and at best weak and not convincing. This is true for gradual, non-explosive, non-intensive, and not out-of-the-ordinary activity for the individual in question.

Evidence showing improvement of joint structures by physical activity is today clearly evident, both in human subjects as well as in the animal model.

Methods of diagnosis of Osteoarthritis are obviously evolving and changing criteria for radiological diagnosis as previously used, may not always concur with the evolving modern methods of cartilage mapping on MRI. New generation MRI machines may further show changes of water content and basic physical or chemical constitution of the joint cartilage and sub-chondral bone, long before classic radiographic criteria for Osteoarthritis would disclose the damage. Future research may eventually disclose the significance and value of these new modalities.

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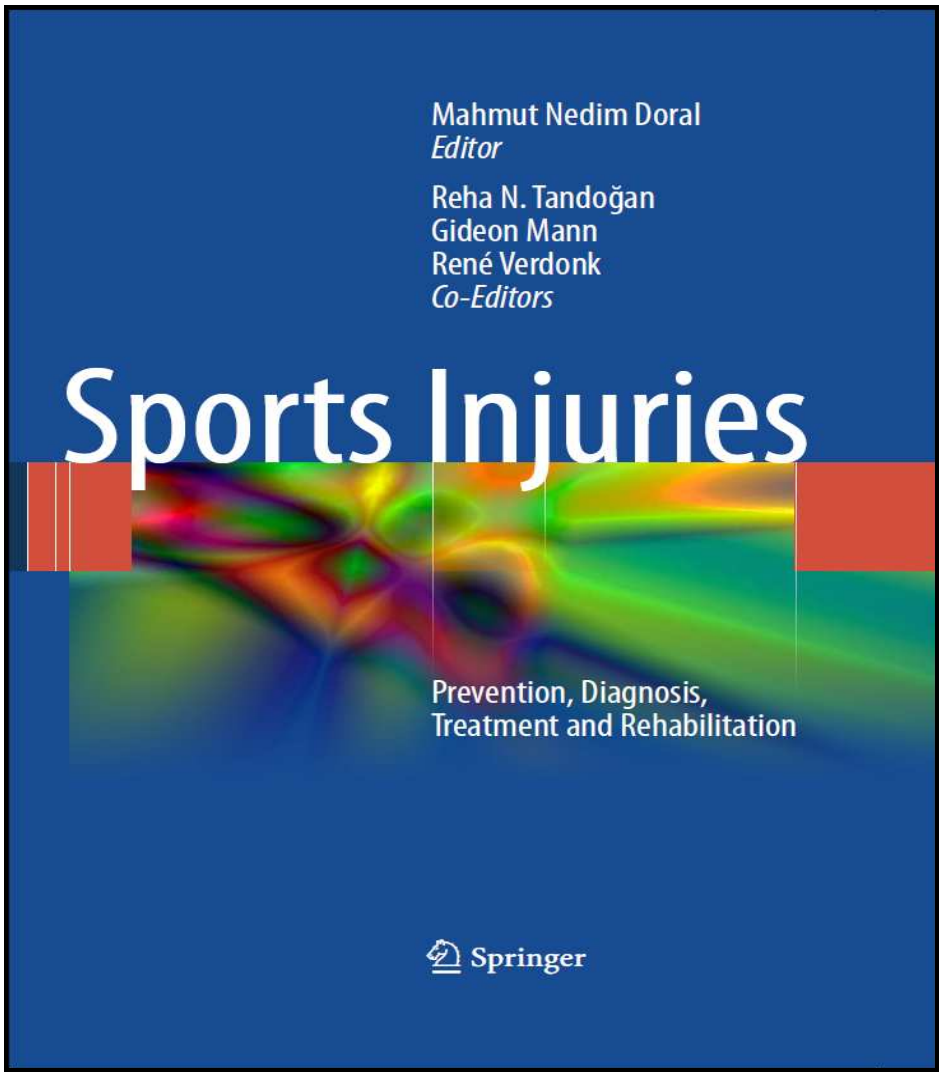

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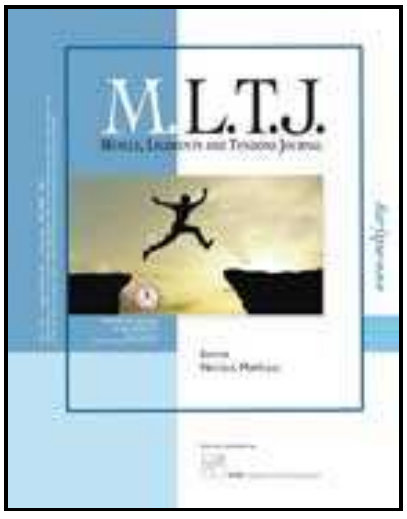

ABSTRACTS OF INTEREST FROM THE CURRENT LITERATURE
gathered by Dr. Debi Ronen
Chair Dept. of Orthopaedic Surgery, Barsilai Hospital, Ashkelon, Israel

Impact of Complications in Total Ankle Replacement and Ankle Arthrodesis

Krause FG, Windolf M, Bora B, Penner MJ, Wing KG, Younger ASE

Major modifications in the design and techniques of total ankle replacement have challenged the perception that ankle arthrodesis is the treatment of choice for end-stage ankle arthritis. High complication and revision rates have been reported after both procedures.

We performed radiographic evaluations at a mean of thirty-nine months following 114 total ankle replacements done with use of commonly used implants and at a mean of thirty-seven months following forty-seven ankle arthrodeses. The mean age was sixty-four years for the patients (fifty-one female and sixty-three male) who underwent total ankle replacement and fifty-nine years in the patients (fifteen female and thirty-two male) who underwent ankle arthrodesis. The impact of complications was analyzed with use of the Ankle Osteoarthritis Scale (AOS), a validated outcome instrument. Both groups had significant improvement in the mean AOS score ($p < 0.001$). There was no significant difference in the mean improvement between the two groups ($p = 0.96$). The complication rate was 54% following total ankle replacement and 26% following ankle arthrodesis, which was a significant difference ($p = 0.003$). The impact of major complications on the AOS outcome score was significant in both the total ankle replacement group ($p = 0.031$) and the ankle arthrodesis group ($p = 0.02$). Conclusions At the time of follow-up, at a minimum of two years postoperatively, the outcomes of total ankle replacement and ankle arthrodesis, with regard to pain relief and function, were comparable. While the rate of complications was significantly higher following total ankle replacement, the impact of complications on outcome was clinically relevant in both groups.

Impact of Complications in Total Ankle Replacement and Ankle Arthrodesis Analyzed with a Validated Outcome Measurement. J Bone Joint Surg Am. 2011;93:830-839

Therapeutic Climbing in Patients with Chronic Low Back Pain

Kai E, Michaela W

Study Design. A randomized controlled study investigated the effects of therapeutic climbing in patients with chronic low back pain. Before and after 4 weeks of training, physical and mental well-being were measured by two questionnaires (36-Item Short Form Health Survey [SF-36]; Hannover Functional Ability Questionnaire for measuring back pain–related disability [FFbH-R]).

Objective. Therapeutic climbing has been suggested to increase muscular strength and perceived physical and mental well-being. This study focused on the psychological effects of therapeutic climbing and compared it with standard exercise therapy.

Summary of Background Data. Therapeutic climbing has become increasingly popular in rehabilitation and its effects on muscular strengthening have been shown. Therapeutic climbing has also been suggested to yield psychological effects such as changes in attentional focus from pain to physical capabilities. To date, no controlled clinical trial has investigated these psychological effects and it is unclear whether therapeutic climbing is comparable or superior to other forms of exercise.

Methods. Twenty-eight patients with chronic low back pain conducted either a therapeutic climbing or a standard exercise regime. Each program took 4 weeks, including four guided training sessions per week. Before and after the program, patients answered two questionnaires assessing their physical and mental well-being.

Results. For the Hannover Functional Ability Questionnaire for measuring back pain–related disability, there was no difference before versus after or between the treatments. For the SF-36, both treatments showed significant improvements in 3/8 subscales of the SF-36. In 2/8 subscales, only the participants of the therapeutic climbing improved and in 1/8 subscales the converse was true. Comparing both groups, significantly larger improvements were found after therapeutic climbing in two subscales of the SF-36: physical functioning and

general health perception.

Conclusion. The benefits of therapeutic climbing were comparable with those of a standard exercise regime. In two subscales of the SF-36, the benefits of therapeutic climbing exceeded those of standard exercise therapy, primarily in perceived health and physical functioning of the patients. This finding demonstrates that therapeutic climbing is equivalent and partly superior to standard exercise therapy for patients with chronic low back pain.

The Effects of Therapeutic Climbing in Patients with Chronic Low Back Pain: A Randomized Controlled Study. Spine. 36(11):842-849, May 15, 2011.

Association between different morphotypes of femoroacetabular impingement

Hartofilakidis G, Bardakos NV, Babis GC, Georgiades G.

We retrospectively examined the long-term outcome of 96 asymptomatic hips in 96 patients with a mean age of 49.3 years (16 to 65) who had radiological evidence of femoroacetabular impingement. When surveillance commenced there were 17, 34, and 45 hips with cam, pincer, and mixed impingement, respectively. Overall, 79 hips (82.3%) remained free of osteoarthritis for a mean of 18.5 years (10 to 40). In contrast, 17 hips (17.7%) developed osteoarthritis at a mean of 12 years (2 to 28). No statistically significant difference was found in the rates of development of osteoarthritis among the three groups ($p = 0.43$). Regression analysis showed that only the presence of idiopathic osteoarthritis of the contralateral diseased hip was predictive of development of osteoarthritis on the asymptomatic side ($p = 0.039$).

We conclude that a substantial proportion of hips with femoroacetabular impingement may not develop osteoarthritis in the long-term. Accordingly, in the absence of symptoms, prophylactic surgical treatment is not warranted.

An examination of the association between different morphotypes of femoroacetabular impingement in asymptomatic subjects and the development of osteoarthritis of the hip. J Bone Joint Surg Br 2011 May;93(5):580-6

Anterior Cruciate Ligament Reconstruction Using Patellar Tendon Versus Hamstring Tendon

Benjamin Wipfler, Stefanie Donner, Christian M. Zechmann, Jan Springer, Rainer Siebold, Hans Heinrich Paessler

To analyze the long-term evaluation of clinical, functional, and magnetic resonance imaging (MRI) results after implant-free press-fit anterior cruciate ligament (ACL) reconstruction with bone–patella tendon (BPT) versus quadrupled hamstring tendon (HT) grafts.

Sixty-two ACL-insufficient patients were included in a prospective, randomized study (31 BPT and 31 HT). Both surgical procedures were performed without any implants by a press-fit technique by the senior author. The femoral tunnel was drilled through the anteromedial portal for anatomic placement. At 8.8 years after reconstruction, 53 patients (28 BPT and 25 HT) were examined by different clinical and functional tests. Bilateral MRI scans were performed and interpreted by an independent radiologist.

On follow-up, the score on the International Knee Documentation Committee evaluation form was significantly better in the HT group. The clinical examination including range of motion, KT-1000 test (MEDmetric, San Diego, CA), and pivot-shift test showed no significant differences. On isokinetic testing, the mean quadriceps strength was close to normal (96%) in both groups, but the hamstring strength was lower in the HT group (100.3%/95.1%). Kneeling (1.5/1.1, P = .002), knee walking (1.72/1.14, P = .002), and single-leg hop test (95.8%/99.1%, P = .057) were better in the HT group. The MRI findings about the mean degree of cartilage lesion (International Cartilage Repair Society protocol) of the operated (2.1/2.1) and nonoperated (1.4/1.8) knee showed no significant differences. No significant difference was found in the grade of medial or lateral meniscal lesion or the number of patients having meniscal lesions when the operated and nonoperated knees were compared. Tunnel measurements, Caton-Deschamps Index, and the sagittal ACL angle were similar.

Conclusions the implant-free press-fit technique for anterior cruciate ligament reconstruction by use of bone–patellar tendon and hamstring grafts with anatomic graft placement is an innovative technique to preserve the cartilage and meniscal status without significant differences between the operated and nonoperated knees in the long term. Significantly less anterior knee pain was noted in the hamstring group, when testing for kneeling and knee walking.

Anterior Cruciate Ligament Reconstruction Using Patellar Tendon Versus Hamstring Tendon: A Prospective Comparative Study With 9-Year Follow-Up. Arthroscopy. 2011 May;27(5):653-65.

Diagnostic Injection in Patients with Femoroacetabular Impingement

Kivlan BR, Martin RL, Sekiya JK

The purpose of this study was to compare the percent relief from injection among subjects with arthroscopic findings of femoroacetabular impingement (FAI) and labral and chondral pathologies while controlling for coexisting extra-articular pathology.

We retrospectively reviewed 72 consecutive subjects (54 female and 18 male subjects), aged 29.9 ± 10.4 years (range, 16 to 55 years), who underwent hip arthroscopy. Three separate analyses of covariance compared the percent relief after injection between groups based on surgically confirmed type of impingement (none, cam, pincer, or combined), labral pathology (none, mild, or torn), and chondral pathology (none, mild acetabular abnormality, acetabular delamination, or femoral lesion) while controlling for the presence of extra-articular pathology (iliotibial band, iliopsoas tendinopathy, or bursitis).

The results of analysis 1 ($F_{3,67}$ = 1.96, P = .128, partial η^2 = .081) and analysis 2 ($F_{2,68}$ = 0.008, P = .992, partial η^2 = .000) indicated no significant main effect for FAI and labral pathology, respectively, on percent relief from injection. The results for analysis 3 indicated a significant main effect for chondral pathology of the hip

on the percent relief from injection ($F_{3,67}$ = 3.03, P < .05, partial η^2 = .128). Post hoc analysis showed that those with mild chondral pathology of the acetabulum and those with acetabular delamination had significantly greater percent relief compared with those without chondral pathology. Extra-articular pathology did not influence the percent relief from injection in any of the analyses.

Conclusions: Subjects with chondral damage had greater relief from injection than those without, regardless of severity. The presence and severity of FAI and labral pathology did not influence the percent relief from injection. Concurrent extra-articular pathology did not alter the interpretation of the percent relief from injection. Therefore the interpretation and diagnostic value of an anesthetic injection in those with primary intra-articular pathology does not need to be altered by the presence of coexisting extra-articular hip pathology.

Response to Diagnostic Injection in Patients With Femoroacetabular Impingement, Labral Tears, Chondral Lesions, and Extra-Articular Pathology. Arthroscopy: The Journal of Arthroscopic and Related Surgery. Volume 27, Issue 5 , Pages 619-627, May 2011

Classification of Meniscal Tears

Anderson AF, Irrgang JJ, Dunn W, Beaufils P, Cohen M, Cole BJ, Coolican M, Ferretti M, Glenn RE Jr, Johnson R, Neyret P, Ochi M, Panarella L, Siebold R, Spindler KP, Ait Si Selmi T, Verdonk P, Verdonk R, Yasuda K, Kowalchuk DA.

Background: Consistency of arthroscopic evaluation and documentation in meniscal tears between investigators is essential to the validity of multicenter studies. A group of experts developed a classification of meniscal tears that may be used internationally.

Hypothesis: The International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) classification of meniscal tears provides sufficient interobserver reliability for pooling of data from international clinical trials designed to evaluate the outcomes of treatment for meniscal tears.

Study Design: Cohort study (diagnosis); Level of evidence, 1.

Methods: A pilot study was performed by having 8 members of the committee grade 10 arthroscopic videos for classification of tear depth, rim width, location, tear pattern, and quality of the tissue. The results of the pilot study were used to change the instruction sheet and evaluation form. International interobserver reliability was determined by having 8 orthopaedic surgeons who practice in different countries evaluate 37 arthroscopic videos selected to represent different meniscal tear characteristics. The Spearman ρ correlation coefficient was used to compare the area of the meniscus excised, as drawn on the diagram, with the numeric percentage of meniscus excised.

Results: There was an 87% agreement for anterior-posterior location of the tear (κ = .65); 79% agreement for tear pattern (κ = .72); 88% agreement for tear depth (κ = .52); 68% agreement for anterior, middle, and posterior location of the tear (κ = .46); and 72% agreement for tissue quality (κ = .47). There was 54% agreement for the rim width (κ = .25) and 67% agreement if the tear was central to the popliteal hiatus (κ = .36). Based on the Landis and Koch criteria for κ coefficients, there was substantial agreement for anterior-posterior location of the tear and tear pattern; moderate agreement for tear depth, anterior, middle, and posterior location of the tear, and tissue quality; and fair agreement for rim width and if the tear was central to the popliteal tear. Interobserver reliability based on the intraclass correlation coefficient (ICC) was good for tear length (ICC = .83) and moderate for percentage of meniscus that was excised (ICC = .65). The mean ρ for all raters was .92 (95% confidence interval [CI], .89-.94) comparing the values for percentage of meniscus excised with the area on the diagrams.

Conclusion: The ISAKOS classification of meniscal tears provides sufficient interobserver reliability for pooling of data from international clinical trials designed to evaluate the outcomes of treatment for meniscal tears.

Interobserver Reliability of the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) Classification of Meniscal Tears. Am J Sports Med. 2011 May;39(5):926-32. Epub 2011 Mar 16

Risk Factors for Syndesmotic and Medial Ankle Sprain

Waterman BR, Belmont PJ Jr, Cameron KL, Svoboda SJ, Alitz CJ, Owens BD.

Background: Syndesmotic and medial ankle sprains constitute up to 15% of all ankle sprains in athletic populations and can result in significant time lost to injury and long-term disability.

Purpose: The objective of this study was to estimate the rate of syndesmotic and medial ankle sprain injuries and identify risk factors associated with these injuries within the physically active cadet population at the United States Military Academy (USMA).

Study Design: Cohort study; Level of evidence, 2.

Methods: The Cadet Illness and Injury Tracking System (CIITS) database at USMA was queried for all ankle injuries between 2005 and 2009. Sex, level of competition, and exposure to sport were among risk factors analyzed.

Results: Among 20 336 person-years, 1206 cadets sustained ankle sprain. Syndesmotic (6.7%) and medial (5.1%) ankle sprains had an incidence rate (IR) of 4.8 and 3.5 per 1000 person-years, respectively. Compared with women, men were 3 times more likely to experience medial ankle sprain (IR ratio [IRR] 3.37; 95% confidence interval [CI]: 1.05, 10.74], but there was no difference in rate of syndesmotic sprains by sex (IRR 1.06; 95% CI: 0.58, 1.95). Athletics accounted for 81% of syndesmotic sprains and 64% of medial sprains. Sprint football (52.3), team handball (men's, 34.7), soccer (men's, 30.5; women's, 6.5), and basketball (men's, 24.8; women's, 6.7) had the highest syndesmotic IR per 100 000 athlete-exposures. Medial sprain IR was highest in men's rugby (16.6) and gymnastics (14.0). When analyzed by athlete-exposure, male intercollegiate athletes had a greater risk of syndesmotic sprain than their female counterparts (3.53; 95% CI: 1.26, 9.83). Furthermore, intercollegiate level of competition had an increased risk of syndesmotic sprain when compared with intramural level (IRR 2.41; 95% CI: 1.03, 5.65).

Conclusion: Male athletes have an over threefold greater risk of medial ankle sprain. Male sex and higher level of competition are risk factors for syndesmotic ankle sprain during athletics.

Risk Factors for Syndesmotic and Medial Ankle Sprain, Role of Sex, Sport, and Level of Competition. Am J Sports Med. 2011 May;39(5):992-8. Epub 2011 Feb 2

Exercise for the Prevention of Overuse Anterior Knee Pain

Coppack RJ, Etherington J, Wills AK.

Background: Anterior knee pain (AKP) is the most common activity-related injury of the knee. The authors investigated the effect of an exercise intervention on the incidence of AKP in UK army recruits undergoing a 14-week physically arduous training program.

Hypothesis: Modifying military training to include targeted preventative exercises may reduce the incidence of AKP in a young recruit population.

Study Design: Randomized controlled trial; Level of evidence, 1.

Methods: A single-blind cluster randomized controlled trial was performed in 39 male and 11 female training groups (median age: 19.7 years; interquartile range, 17-25) undergoing phase 1 of army recruit training. Each group was randomly assigned to either an intervention (n = 759) or control (n = 743) protocol. The intervention consisted of 4 strengthening and 4 stretching exercises completed during supervised physical training lessons (7 per week). The control group followed the existing training syllabus warm-up exercises. The primary outcome was a diagnosis of AKP during the 14-week training program.

Results: Forty-six participants (3.1%; 95% confidence interval [CI], 2.3-4.1) were diagnosed with AKP. There were 36 (4.8%; 95%CI, 3.5-6.7) new cases of AKP in the control group and 10 (1.3%; 0.7-2.4) in the intervention group. There was a 75% reduction in AKP risk in the intervention group (unadjusted hazard ratio =

0.25; 95% CI, 0.13-0.52; P < .001). Three participants (0.4%) from the intervention group were discharged from the military for medical reasons compared to 25 (3.4%) in the control group.

Conclusion: A simple set of lower limb stretching and strengthening exercises resulted in a substantial and safe reduction in the incidence of AKP in a young military population undertaking a physical conditioning program. Such exercises could also be beneficial for preventing this common injury among nonmilitary participants in recreational physical activity.

The Effects of Exercise for the Prevention of Overuse Anterior Knee Pain. A Randomized Controlled Trial. Am J Sports Med. 2011 May;39(5):940-8. Epub 2011 Jan 6.

The Israel Society of Sports Medicine Site: www.sport.doctorsonly.co.il
The International Jerusalem Symposium on Sports Medicine Site: www.sportsmedicine.co.il

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FUTURE COURSES & MEETINGS

24-27 August 2011	Panther Global Summit 2011 Anatomic ACL Reconstruction	Pittsburgh, USA	http://www.upmcphysicianresources.com/PantherSummit
27 August 2011	50th Shoulder Severance Arthroscopy Fresh Cadever Workshops	Seoul, South Korea	http://www.severanscopy.com/
6-9 September 2011	XXV Triennial World Congress of the International Society of Orthopaedic Surgery and Traumatology (SICOT)	Prague, Czech Republic	http://www.sicot.org/?id_page=325
7-10 September 2011	4th Live Arthroscopy Festival 2011	Portorose, Slovenia	http://www.arthroscopy-festival.com/
13-16 September 2011	BOA/IOA (British Orthopaedic Association & Irish Orthopaedic Association) Combined Meeting	Dublin, Ireland	http://www.boa.ac.uk / www.ioa.ie
14-17 September 2011	European Society for Surgery of the Shoulder and the Elbow	Lyon, France	http://www.mcocongres.com
22-23 September 2011	Xth Congress of the Portuguese Arthroscopy and Sports Trauma Society (SPAT)	Porto, Portugal	http://www.spat.pt/
22-24 September 2011	28. Kongress der Deutschsprachigen Arbeitsgemeinschaft für Arthroskopie	Regensburg, Germany	http://www.aga-kongress.info/aga2011/index.html
26-28 September 2011	16th-International Course on Shoulder Arthroscopy and Surgery	Munich, Germany	http://www.sportortho.med.tu-muenchen.de/?menue=kongresse
28-29 September 2011	The 1st Symposia Conference of Lower Limb Sports and Surgical Medicine	Athens, Greece	http://www.symposiaconferencing.com/main/
29-30 September 2011	3rd Stockholm Arthroscopy Conference	Stockholm, Sweden	http://www.capioartroclinic.com/eng/
5-7 October 2011	Orthopedic Surgery Controversies 2011	California, USA	http://www.orthopedicsurgerycontroversies.com/
7-9 October 2011	2011 Korea Arthroscopy Society Annual Meeting With Arthroscopy Master of ASIA	Seoul, Korea	http://www.korarthro.com/
14-15 October 2011	Miami International Sports Medicine Symposium	Miami Beach, USA	http://www.sportsmedicinesymposium.com/
19-22 October 2011	The Australian Conference of Science and Medicine in Sport (ACSMS)	Australia	http://sma.org.au/conference/future-conferences/acsms-2011/
26-29 October 2011	7th European Congress of Sports Medicine – 3rd Central European Congress of Physical Medicine and Rehabilitation	Salzburg, Austria	http://www.sportsmed-pmr-2011.at/
31 October – 5November 2011	XXII th National Turkish Orthopaedics and Traumatology Congress	Antalya, Turkey	http://www.totbidkongre2011.org/
3-4 November 2011	The Annual Meeting of the Israel Society of Sports Medicine & 28th International Jerusalem Symposium on Sports Medicine	Ramat Gan, Israel	http://www.sportsmedicine.co.il
18-19 November 2011	7. Gelenksymposium	Villingen-Schwenningen, Germany	http://www.gelenksymposium.de
24-26 November 2011	Open European Knee Associates (EKA) Meeting	Vienna, Austria	http://www.eka-esska-2011.org
8-10 December 2011	Kasr Al Aini Arthroscopy Course	Cairo, Egypt	http://www.lrc.edu.eg/
16-18 December 2011	13th National Turkish Sports Medicine Congress	Bursa, Turkey	http://www.sporhekimligi2011.org/default.asp?sayfa=anasayfa
22 January 2012	4th Advanced Course on Knee Surgery	Val d'Isère, France	http://www.kneecourse.com/

7-11 February 2012	Annual Meeting of AAOS	San Francisco, USA	http://www.aaos.org/education/anmeet/anmeet.asp
21-24 February 2012	2nd International Congress of Iranian Society of Kne Surgery, Arthroscopy & Sports, Traumatology ISKAST	Kish Island, Iran	http://www.iskast.ir/
9-10 March 2012	International Congress on Cartilage Repair of the Ankle	Dublin, Ireland	
18-21 April 2012	XII International Congress of the Arthroscopy Association of Argentina (AAA), Combined Meeting with the Arthroscopy Association of North America (AANA)	Buenos Aires, Argentina	http://www.artroscipia.com.ar
19-22 April 2012	1st World congress on Controversies in Arthroplasty, spine, Orthopaedic Trauma, Arthroscopic Surgery and Sports Medicine (CORTY)	Barcelona, Spain	http://www.comtecmed.com/corty/2011/
25-28 April 2012	9th International Forum on Orthopaedic Sports Medicine & Arthroscopy (IFOSMA)	Shanghai, China	http://www.isakos-shanghai.com/2012/
2-5 May 2012	15th ESSKA Congress	Geneva, Switzerland	http://esska-congress.org/esska2012/index.html
12-15 May 2012	10th ICRS World Congress	Montreal, Canada	http://www.cartilage.org/
16 May 2012	AANA / SLARD Pre Meeting	Orlando, USA	http://www.aana.org/
23-25 May 2012	13th EFORT Congress 2012	Berlin, Germany	http://www.efort.org/berlin2012/
27-30 September 2012	XXXII FIMS World Congress of Sports Medicine	Rome, Italy	http://www.fimsroma2012.org/
2-6 October 2012	11th Turkish Sports Traumatology Arthroscopy and Knee Surgery Congress	Ankara, Turkey	http://www.tusyad.org
8-11 November 2012	Congress of Arthroscopy and Sports Medicine (CASM 2012)	Jaipur, India	http://www.casm2012.com
17-20 October 2012	World Sport Trauma Congress	London, UK	http://www.wstc2012.com
12-16 May 2013	9th Biennial International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) Congress	Toronto, Canada	http://www.isakos.com/meetings/2013congress/
13-16 June 2013	XVIII th FESSH Congress	Antalya, Turkey	http://www.fessh.com; gursel@hacettepe.edu.tr

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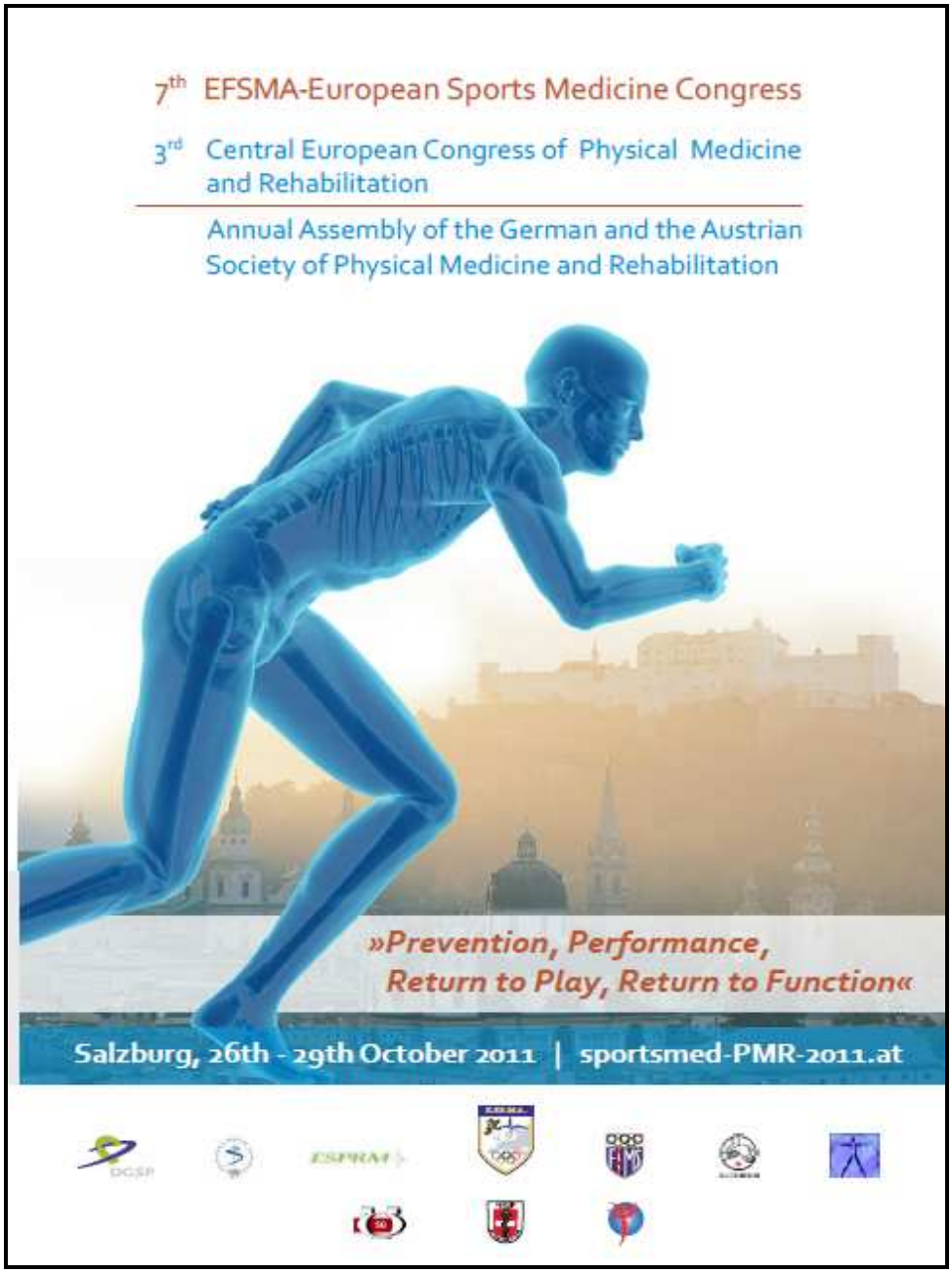

Friday 28th OCTOBER 13:30 – 15:00
EFOST - Symposium: Rehabilitation and Return to Sport After Surgery

***Chairs**: J. Huylebroek & G. Mann*
Topics: Return After Shoulder Reconstruction, After ACL Surgery, Achilles Tendon Surgery and After Cartilage Surgery
Speakers: P. PAPADOPOULOS (Greece), M.N. DORAL (Turkey), F. ALMQVIST (Belgium), G. MANN (Israel), J. HUYLEBROEK (Belgium)

7. Gelenksymposium

ARTHROSKOPIE-, SCHULTER- UND KREUZBANDWORKSHOP

Villingen-Schwenningen
18. und 19. November 2011

Schulter, Ellenbogen, Meniskus, Kreuzband

Wissenschaftliche Leitung
Gernot Felmet
Matthias Steinwachs
Friedrich Thielemann

Patronate und Gütesiegel
Deutschsprachige Arbeitsgemeinschaft für Arthroskopie
Arbeitskreis „Implantatfreier Kreuzbandersatz und biologische Optimierung"
Berufsverband der Fachärzte für Orthopädie und Unfallchirurgie
Stiftung Akademie Deutscher Orthopäden
European Federation of National Associations of Orthopaedic Sports Traumatology

GÜTESIEGEL

EFOST

TiGenix

CHONDROCELECT

Product information: brief summary

NAME OF THE MEDICINAL PRODUCT: ChondroCelect 10,000 cells/microlitre implantation suspension. **QUALITATIVE AND QUANTITATIVE COMPOSITION : General description :** Characterized viable autologous cartilage cells expanded *ex vivo* expressing specific marker proteins. **Qualitative and quantitative composition :** Each vial of product contains 4 million autologous human cartilage cells in 0.4 ml cell suspension, corresponding to a concentration of 10,000 cells/microlitre. **PHARMACEUTICAL FORM:** Implantation suspension. Before re-suspension the cells are settled to the bottom of the container forming an off-white layer and the excipient is a clear colourless liquid. **Therapeutic indications:** Repair of single symptomatic cartilage defects of the femoral condyle of the knee (International Cartilage Repair Society [ICRS] grade III or IV) in adults. Concomitant asymptomatic cartilage lesions (ICRS grade I or II) might be present. Demonstration of efficacy is based on a randomized controlled trial evaluating the efficacy of Chondrocelect in patients with lesions between 1-5cm². **Posology and method of administration:** ChondroCelect must be administered by an appropriately qualified surgeon and is restricted to hospital use only. ChondroCelect is solely intended for autologous use and should be administered in conjunction with debridement (preparation of the defect bed), a physical seal of the lesion (placement of a biological membrane, preferentially a collagen membrane) and rehabilitation. Posology: The amount of cells to be administered is dependent on the size (surface in cm²) of the cartilage defect. Each product contains an individual treatment dose with sufficient number of cells to treat the pre-defined lesion size, as measured at biopsy procurement. The recommended dose of ChondroCelect is 0.8 to 1 million cells/cm², corresponding with 80 to 100 microlitre of product/cm² of defect. Method of administration: ChondroCelect is intended solely for use in autologous cartilage repair and is administered to patients in an Autologous Chondrocyte Implantation procedure (ACI). The implantation should be followed by an appropriate rehabilitation schedule for approximately one year, as recommended by the physician. **Contraindications:** Hypersensitivity to any of the excipients or to bovine serum. ChondroCelect must not be used in case of advanced osteoarthritis of the knee. **Undesirable effects:** In a randomized, controlled study in the target population, 51 patients were treated with ChondroCelect. In these patients, a periosteal flap was used to secure the implant. Adverse reactions occurred in 78.4% of the patients over a 36-months postoperative follow-up period. The most common adverse reactions were arthralgia (47.1%), cartilage hypertrophy (27.4%), joint crepitation (17.6%) and joint swelling (13.7%). Adverse reactions collected from 370 patients included in a Compassionate Use Program are similar to those reported in the target population. Most of the reported adverse reactions were expected as related to the open-knee surgical procedure. The most frequently occurring reactions reported immediately after surgery include joint swelling, arthralgia and pyrexia. These were generally mild and disappeared in the weeks following surgery. Adverse reactions of special interest: *Arthrofibrosis:* In the compassionate use patients, a higher incidence of arthrofibrosis and decreased joint range of motion was observed in a subgroup of patients with a patellar lesion (8.2% and 13.1% respectively) compared to non-patellar lesions (0.6% and 2.6% respectively). *Cartilage hypertrophy:* In the majority of the 370 patients included in the Compassionate Use Program, a collagen membrane instead of a periosteal flap was used to seal the defect. According to current literature the incidence of cartilage hypertrophy can be reduced by using a collagen membrane to cover the lesion site instead of using a periosteal flap (Gooding *et al*., 2006; Niemeyer *et al*., 2008). When a collagen membrane was used to seal the lesion site after application of ChondroCelect, the incidence of cartilage hypertrophy was reported to be 1.8% compared to 25% in the randomized, controlled trial alone. **Name of the MA holder**: TiGenix NV, Romeinse straat 12/2, B-3001 LEUVEN, Belgium. **Product authorization number**: EU/1/09/563/001.

Medicinal product to restricted medical prescription – restricted to hospital use only.

stryker

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Flexibility
In Action

ACL Instrumentation